

Effects of corn supplementation on the antioxidant activity, selected minerals, and gene expression of selenoprotein and metallothionein in serum, liver, and kidney of sheep-fed palm kernel cake: urea-treated rice straw diets

ABSTRACT

This study aimed to determine influence of corn inclusion on glutathion peroxidase (GPx) activity, selected minerals concentration, and gene expression in sheep-fed palm kernel cake (PKC) and urea-treated rice straw. Twenty-seven of Dorper sheep were divided into three groups and fed a basal diet of (20% rice straw and 80% concentrate) with addition of ground corn at either 0% (T1), 5% (T2), or 10% (T3), respectively. After 120 days feeding trial, all animals were slaughtered and tissue samples of kidney, liver, and muscles were taken for enzyme and mineral analyses. The results showed that Cu concentration in the liver was lower treatment T3 compared to the control and T2. The serum activity of GPx was higher in T2 than in T3 at day 120 of experiment. Serum malondialdehyde (MDA) concentrations decreased at day 80 in sheep on T3, whereas MDA of liver increased linearly with increasing corn supplementation. The qRT-PCR analyses revealed significant up-regulation of ATP7A and MIA genes in T3, while hepatic Cu/Zn SOD, GPx1, and GPx4 mRNA showed a higher expression in lamb hepatocytes in T3 compared to those on T1. Present study results suggest that feeding PKC as basal diet can increase antioxidant activity, but cause liver dysfunction in sheep. Inclusion corn was found to regulate transcriptional levels of the GPx family and metallothionein genes. These genes may play a role in the antioxidant protection response and reduce incidence of toxicity associated with Cu.

Keyword: Gene expression; Toxicity; Corn; Antioxidant enzymes; Dorper sheep; Palm kernel cake